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with different degrees of velocity, but contrariwise, the rope or chain winding on one cylinder, at the same time it unwinds from the other, so that a weight hanging by a pulley from the middle or bite of the rope or chain is raised or lowered by the turning of those cylinders; for it is evident that the larger cylinder, or that moving with the greater velocity, will take the rope or chain faster than the smaller cylinder, or that moving with the lesser velocity; and, since the two ends of the rope or chain fastened to each cylinder tend to turn them in opposite directions, and each sustains an equal weight, they counteract each other and balance the weight, which consequently cannot run down of itself; and thereby the utmost safety is obtained in raising or lowering it. One of the cylinders may be turned by hand with a winch, or by a walking or raising wheel, or by any other mode of applying power; the other cylinder is to be turned from the first by toothed wheels on the axis of each; to give the respective and required velocities, the cylinders may be of equal diameter, and the toothed wheels unequal, or the cylinders unequal, and the toothed wheels, observing that the nearer the diameters and velocities of the cylinders are to each other, the greater will be the power of the machine, and the slower will the weights be raised or lowered.

Observations of the Patentee.

The advantage that will result from this improvement is principally safety; from the present constructed cranes, and particularly those with walking wheels, the number of persons killed or maimed almost exceed credibility. Indeed, accidents, from the working of cranes, have hitherto been considered so much a matter of course, that one might conclude all practicable means of prevention

had been tried without effect; for, notwithstanding the great mechanical improvements recently made in almost every kind of machinery, the present patentee is the first that has undertaken to construct cranes on a principle that will prevent the recurrence of those accidents; and he appears fully persuaded that a few minutes attention to his specification will convince any person that, by adopting his improvement, all liability of accidents will be removed, insomuch, that a stranger, who had never before seen a crane, might be entrusted with the raising or lowering goods with the same safety as the most experienced workman; another advantage attending it is, that one person is competent to lower any weight, however great; for, though the weight cannot run down of itself, it will require very little power to turn the winch or walking wheel in order to lower it; any of the present constructed cranes may, at a small expense, be altered to work on the principle of the patent.

MATHEMATICAL PHENOMON.

A child under eight years of age has lately been exhibited at Spring Gardens, possessed of wonderful powers for performing arithmetical operations. His name is Zerah Colburn, and he was born at Cabut, in Vermont, in the United States of America, on the 1st of September, 1804. About two years ago, being at that time not six years of age, he first began to show his wonderful powers of calculation. His father, who had not given him any other instruction than such as is to be obtained at a small day school, was surprised one day to hear him repeating the products of several numbers. The news of this infant prodigy soon circulated through the neighbourhood, and the father was

encouraged to undertake the tour of the United States, and finally to visit London, where they arrived on the 12th of May last. He determines, with the greatest facility and dispatch, the exact number of minutes or seconds in any given period of time. He tells the exact product arising from the multiplication of any numbers, consisting of two, three, or four figures ; or, any number, consisting of six or seven places of figures, being proposed, he will determine, with expedition and ease, all the factors of which it is composed. This singular faculty consequently extends to the raising of powers, and to the extraction of the square and cube roots of the number proposed, and likewise to the means of determining whether it be a prime number. At a meeting of friends, this child raised the number 8 progressively to the sixteenth power, and, in naming the last result, 284,474,976,710,656, he was right in every figure. He was asked the square root of 106929, and, before the number could be written down, he answered 327. He was then required to name the cube root of 268,336,125, and with equal facility and promptness replied 645. One of the party requested him to name the factors which produced the number 247433, which he immediately did by mentioning the two numbers 941 and 268 ; which indeed are the only two numbers that will produce it. Another of them proposed 171395, and he named the following factors as the only ones that would produce it, viz. 5×34279 , 7×24485 , 59×2905 , 83×2065 , 35×4897 , 295×581 , and 413×415 . He was then asked to give the factors of 36083 ; but he immediately replied that it had none ; which in fact was the case, as 36083 is a prime number. One gentleman asked him how many minutes there were in forty-eight

years ; and before the question could be written down, he replied 25,228,800 ; and instantly added, that the number of seconds in the same period was 1,513,728,000. In one case he was asked to tell the square of 4395 ; he at first hesitated, but, when he applied himself to it, he said it was 19,316,025. On being questioned as to the cause of his hesitation, he replied that he did not like to multiply four figures by four figures ; "but," said he, "I found out another way : I multiplied 293 by 293, and then multiplied this product twice by the number 15, which produced the same result." On another occasion, the Duke of Gloucester asked him the product of 21,734 multiplied by 543 : he immediately replied 11,801,562 : but, upon some remark being made, the child said he had, in his own mind, multiplied 65202 by 181. Although in the first instance it is evident that 4395 is equal to 293×15 , and consequently that $(4395)^2 = (293)^2 \times (15)^2$; and that in the second case 543 is equal to 181×3 , and consequently that $21734 \times (181 \times 3) = (21734 \times 3) \times 181$; yet, it is remarkable that this combination should be immediately perceived by the child. Perhaps this child possesses an intuitive knowledge of some important properties of numbers ; and, although he is incapable at present of giving any satisfactory account of the state of his mind, or of communicating to others the knowledge which it is so evident he does possess, yet there is reason to believe that, when his mind is more cultivated, he will be able to divulge the mode by which he operates, and to point out some new principles of calculation. With this view a number of gentlemen have taken the child under their patronage, and have formed themselves into a committee for the purpose of superintending his education ; but

whether they shall be able wholly to accomplish the object they have in view, much depends on the assistance they may receive from the public.

[*Monthly Magazine.*]

A patent Metallic Life Boat, on pneumatic and hydrostatic principles, that will neither sink nor overset, yet serve all the ordinary purposes of ships' boats, either for rowing or sailing, was tried lately near London-bridge. It was the ebb tide, during the time of the greatest fall, and she had her crew on board, and was filled with water. She passed through with the greatest safety, and discharged a considerable portion of the water which had been purposely put into her. This Life-boat is made of malleable iron, lead, and tin, twenty feet long, and six feet wide, and draws only ten inches of water, with twenty-five persons. They possess valves, that without pumping, or personal aid, discharge all the water from them, which valves act occasionally as pneumatic, or air valves; they are hydrostatically ballasted with confined water, taken in or put out at pleasure; and are remarkably buoyant and lively in agitated water. It is the invention of Mr. Dodd, the engineer.

[*Monthly Magazine.*]

Oxy-muriatic acid used to guard against infection of close air, and marsh miasmata.

Messrs. Thenard and Cluzel being sent to Flushing to direct the means of health, they ordered earthen vessels to be placed in the apartments for the soldiers, as well as those where prisoners were confined; these were filled with oxy-muriatic acid, greatly diluted with water, and they obliged every man employed on the fortifications to dip his hands into

one of the vessels every morning before he went out to his work. They placed similar vessels in the ditches of stinking mud, so that, from these and the fumigations employed, the workmen were immersed day and night in an atmosphere of oxy-muriatic acid, and preserved their health. It further appears, that many of the prisoners infected with the itch soon experienced the good effects of this immersion of their hands in diluted oxy-muriatic acid. One who had the disease all over him in an inveterate degree, and that had resisted every application, requested permission to wet rags in the bowls, and rub his body with them, and by so doing was perfectly cured in a few days.

[*Monthly Magazine.*]

REAPING MACHINE.

The Committee of the Dalkeith Farming Club, and a numerous concourse of spectators, lately assembled at the farm of Sineaton, near Dalkeith, to witness the competition for the premium of £.500, offered by the Club to any inventor of a reaping machine, capable of cutting down two acres of corn in the period of 5 hours, with one or two horses, and two men. Several competitors were expected, but only one appeared, Mr. Smith, of the Deanstoun works, near Dome, Perthshire, who exhibited a machine of great elegance and simplicity, impelled by one horse moving behind, while the action of the axle puts in rapid motion, at the opposite end of the machine, a drum, with a circular cutter affixed to it. By the movement of the drum, the cut grain is laid in a row, and the machine is so constructed, that the drum can, at pleasure, revolve towards the one or the other side, so as both are going and returning along the ridge, to throw the grain towards the open side of the